



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/590,352

05/21/2007

Hans Van Der Laan

081468-0356680

8164

909

7590

02/19/2010

PILLSBURY WINTHROP SHAW PITTMAN, LLP
P.O. BOX 10500
MCLEAN, VA 22102

EXAMINER

TON, TRI T

ART UNIT

PAPER NUMBER

2877

MAIL DATE

DELIVERY MODE

02/19/2010

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/590,352	VAN DER LAAN ET AL.	
	Examiner	Art Unit	
	TRI T. TON	2877	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 November 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16, 18-20, 22-37 and 39-41 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12, 16, 18-20, 22-33, 37 and 39-41 is/are rejected.
- 7) ☐ Claim(s) 13-15 and 34-36 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 August 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

1. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

The amended claims 1-20 have overcome the 101 issue, therefore the Rejection – 35 USC 101 is hereby withdrawn.

2. Applicants' arguments, see pages 13-21, filed 11/25/09, with respect to rejection(s) of claim(s) 1-12, 16-19, 22-33, and 37, 39-40 under Rejection – 35 USC 102(b) and of claims 20, 41 under Rejections – 35 USC 103(a) have been fully considered but are not persuasive.

3. With respect to applicants' arguments, see pages 14-16, regarding Reopen Prosecution, in order to pursue the prosecution up to the Appeal Board, the examiner did not withdraw old rejections under 35 USC 102 and 103, they merely added the rejection of claims 1-16 and 18-20 under 35 USC 101. Because claims 13-15 were previously objected to because they recited subject matter indicated as allowable, the prosecution of the instant application was reopened. See MPEP 1207.03 II. The art rejections, 102 and 103 were maintained.

4. With respect to applicants' arguments, see pages 16-20, with respect to the rejection(s) of claim(s) under 102(e) and 103(a), Micher et al. (Publication No. US 2003/0048458) discloses **regression analysis of calibration spectral measurement data** ([0080]). Micher also discloses

Art Unit: 2877

determining a mathematical model for determining unknown values of process parameters of an object in a device manufacturing process (paragraphs [0056-0060], [0061]-[0065] and [0066] lines 1-3). Mieher does not need to recognize and consider the shape information must be the same as spectra information. The important thing here is that Mieher has already taught the subject matter of the current application: “determining a mathematical model by using said known values of said at least one process parameter ([0056], [0060]), (equations model is not different from mathematical model) and by employing a multi-variant regression technique ([0080], lines 7-24) on said calibration spectral measurement data (paragraph [0080]), said mathematical model comprising a number of regression coefficients (paragraphs [0061]-[0065] and [0066] lines 1-3)”.

The applicants’ arguments on page 19-20 need to be disclosed in the claims in order to be considered.

5. As mentioned in the previous examiner’s argument filed on 08/28/09, Mieher discloses measurement spectra data being interpreted into shape parameter information ([0080], lines 1-3, figure 13, elements 306, (3)). Note that, shape parameter information of measurement spectra is an only type of spectral measurement data. Applicants disclose the same matter as describe above, that is spectral measurement data being interpreted into shape parameter information (applicants’ figure 4, element 402). Therefore, the applicants’ actual physical structure is shape parameter information which being disclosed in Mieher’s reference.

In MPEP 37 CFR 1.111. under topic **Reply by applicant or patent owner to a non-final Office action** stated: “*In amending in reply to a rejection of claims in an application or*

Art Unit: 2877

patent under reexamination, the applicant or patent owner must clearly point out the patentable novelty which he or she thinks the claims present in view of the state of the art disclosed by the references cited or the objections made. The applicant or patent owner must also show how the amendments avoid such references or objections.”

In MPEP 2163, under subheading “New or Amended Claims,” states “A claim that omits an element which applicant describes as an essential or critical feature of the invention originally disclosed does not comply with the written description requirement.”

“Further guidance in interpreting the scope of equivalents is provided in MPEP § 2181 through § 2186. While it is appropriate to use the specification to determine what applicant intends a term to mean, a positive limitation from the specification cannot be read into a claim that does not itself impose that limitation. A broad interpretation of a claim by USPTO personnel will reduce the possibility that the claim, when issued, will be interpreted more broadly than is justified or intended.”

For at least the foregoing reasons, the examiner submits that claims 1 and 22 are anticipated by Micher’s reference.

Claims 17, 21, 38, 42 have been cancelled.

Grounds for the rejection of claims 1-16, 18-20, 22-33, 37, 39-41 are maintained and provided below.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. Claims 1-12, 16-19, 22-33, and 37-40 are rejected under 35 U.S.C. 102(e) as being taught by Mieher et al. (Publication No. US 2003/0048458). Hereafter, “Mieher”.

Regarding Claim 1, Mieher teaches obtaining calibration spectral measurement data ([0044-0045]) from a plurality of calibration marker structure sets provided on a calibration object (paragraph [0032], lines 1-6), each of said plurality of calibration marker structure sets comprising at least one calibration marker structure ([0032], lines 6-17), calibration marker structures of different calibration marker structure sets being created using different known values of said at least one process parameter (paragraph [0032], lines 17-21, [0039], [0045], [0058]);

determining a mathematical model by using said known values of said at least one process parameter ([0056], [0060]), (equations model is not different from mathematical model) and by employing a multi-variant regression technique ([0080], lines 7-24) on said calibration spectral measurement data (paragraph [0080]), said mathematical model comprising a number of regression coefficients (paragraphs [0061]-[0065] and [0066] lines 1-3);

obtaining spectral measurement data from at least one marker structure provided on a object ([0009]-[0010], [0037], lines 1-7), said at least one marker structure being made using an unknown value of said at least one process parameter ([0037], lines 4-17, [0058], [0060], [0088]);

Art Unit: 2877

comparing the obtained spectral measurement data with the calibration spectral measurement data ([0047], [0080], lines 7-13), to determine the unknown value ([0008], (determine the values means these values are unknown before), [0080], lines 12-13), (the error is reduced to the specified value) of said at least one process parameter for said substrate from said obtained spectral measurement data (paragraph [0008]) by employing said regression coefficients of said mathematical model (paragraph [0060], [0080], claims 16, 17); and

adjusting a control parameter of a lithographic apparatus (figure 1) based on the unknown value of said at least one process parameter for said object in the device manufacturing process ([0080-0090], figures 2-4).

Regarding Claim 22, Miehner teaches

a detector arranged ([0048]) to obtain calibration spectral measurement data ([0044-0045]) from a plurality of calibration marker structure sets provided on a calibration object (paragraph [0032], lines 1-6), each of said plurality of calibration marker structure sets comprising at least one calibration marker structure ([0032], lines 6-17), calibration marker structures of different calibration marker structure sets being created using different known values of said at least one process parameter (paragraph [0032], lines 17-21, [0039], [0045], [0058]);

a processor unit ([0080], lines 19-21) storing a mathematical model by using said known values of said at least one process parameter ([0056], [0060]), (equations model is not different from mathematical model) and by employing a multi-variant regression technique ([0080], lines 7-24) on said calibration spectral measurement data (paragraph [0080]), said mathematical model comprising a number of regression coefficients (paragraphs [0061]-[0065] and [0066] lines 1-3);

said processor unit being arranged to obtain spectral measurement data from at least one

Art Unit: 2877

marker structure provided on a object ([0009]-[0010], [0037], lines 1-7), said at least one marker structure being made using an unknown value of said at least one process parameter ([0037], lines 4-17, [0058], [0060], [0088]);

and to compare the obtained spectral measurement data with the calibration spectral measurement data ([0047], [0080], lines 7-13), to determine the unknown value ([0008], (determine the values means these values are unknown before), [0080], lines 12-13), (the error is reduced to the specified value) of said at least one process parameter for said substrate from said obtained spectral measurement data (paragraph [0008]) by employing said regression coefficients of said mathematical model (paragraph [0060], [0080], claims 16, 17); and

Regarding Claims 2, 3, 23, 24, Mierher teaches calibration measurement data and said measurement data are obtained with an optical detector ([0048]), (it is obvious to have a scatterometry technique used to measure the grating structure having beams detected by using optical detector).

Regarding Claims 4, 25, Mierher teaches multi-variant regression technique used by the mathematical model is selected from a group consisting of principal component regression, non-linear principal component regression, partial least squares modeling and non-linear partial least squares modeling (paragraph [0080], lines 7-14).

Regarding Claims 5, 6, 26, 27, Mierher teaches substrate comprising one of the groups consisting of a test wafer and a product wafer (paragraph [0010], lines 3-5).

Art Unit: 2877

Regarding Claims 7, 28 Miehler teaches at least one marker structure being positioned on said substrate within one of the group consisting of a chip area and a scribe-lane (paragraph [0032], lines 4-17).

Regarding Claims 8, 29, Miehler teaches at least one marker structure being a part of a device pattern within a chip area (paragraph [0032], lines 4-17).

Regarding Claims 9, 30, Miehler teaches at least one marker structure comprising a diffraction grating (paragraph [0044], lines 9-12).

Regarding Claims 10, 31, Miehler teaches preprocessing the obtained calibration spectral measurement data ([0044]) and the obtained spectral measurement data before said employing said regression coefficients (paragraph [0037], [0080]).

Regarding Claims 11, 32, Miehler teaches preprocessing comprising performing on said data at least one of the group of mathematical operations consisting of subtraction of a mean, division by standard deviation, selection of optical parameters and weighing of optical parameters (paragraphs [0060]-[0068]), and wherein the optical parameters include at least one of the group of parameters consisting of wavelength, angle and polarization state (paragraph [0003]).

Regarding Claims 12, 33, Miehler teaches each of said plurality of calibration marker structure sets comprising at least a first and a different second calibration marker structure (paragraph [0008], lines 10-11).

Art Unit: 2877

Regarding Claims 16, 37, Mieher teaches at least one calibration structure within a calibration marker structure set and said marker structure have substantially comparable shapes (paragraphs [0032], [0044], lines 16-24).

Regarding Claims 18, 19, 39, 40, Mieher teaches method being related to at least one of a lithographic apparatus and a track ([0002]), and at least one process parameter is selected from a group consisting of focus, exposure dose, overlay error, track parameters related to dose, variation of line width over reticle, variations from reticle-to-reticle, projection lens aberrations, projection lens flare, and angular distribution of light illuminating the reticle (paragraph [0003]).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 20 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mieher et al. (Publication No. US 2003/0048458) in view of Bowley, Jr. et al. (U.S. Patent No. 6,917,901).

Hereafter, “Mieher” and “Bowley”.

Regarding Claims 20, 41, Mieher teaches an illumination system configured to provide a beam of radiation (paragraph [0002], lines 5-8);

the patterning structure serving to impart the beam of radiation with a pattern in its cross-

Art Unit: 2877

section (paragraph [0002], lines 9-11);

a projection system configured to project the patterned beam onto a target portion of the substrate (paragraph [0002], lines 8-11).

However, Miehler does not teach a support structure and a substrate table. Bowley teaches a support structure configured to support a patterning structure (Figure 1, elements 110 and 120), (column 4, lines 49-53), a substrate table configured to hold the substrate (column 4, lines 54-57). It would have been obvious to one having ordinary skill in the art at the time of the invention was made to modify Miehler by adding a support structure and a substrate table for supporting the patterning structure and holding the substrate in order to improve the measurement process for a lithographic apparatus.

Allowable Subject Matter

10. Claims 34-36 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

11. The allowable Subject matter was indicated in office Action mailed on 09/04/2008.

Conclusion

12. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after

Art Unit: 2877

the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Fax/Telephone Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tri T. Ton whose telephone number is (571) 272-9064. The examiner can normally be reached on 10:30am - 7:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley, Jr. can be reached on (571) 272-2059. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Gregory J. Toatley, Jr./
Supervisory Patent Examiner,
Art Unit 2877

February 12, 2009
Examiner /TTT/

Application/Control Number: 10/590,352

Page 12

Art Unit: 2877

20 February 2010